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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,762	02/09/2004	Trung T. Doan	MCRO:144-3 92-0321-04	6167

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EXAMINER

NOVACEK, CHRISTY L

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/774,762

Applicant(s)

DOAN ET AL. 

Examiner

Christy L. Novacek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 19-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This office action is in response to the amendment filed December 28, 2005.

#### ***Claim Rejections - 35 USC § 102***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 19-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Woo et al. (US 5,262,352, previously cited).

Regarding claims 19 and 27, Woo discloses a single first planarization layer (14 and/or 15) disposed on a semiconductor substrate (10), a barrier film (16) having a structural integrity disposed on the first planarization layer, a single second planarization layer (17 and/or 18 and/or 20) disposed on the barrier film (col. 3, ln. 22 – col. 4, ln. 15). Inherently, the first and second planarization layers have reflow temperatures and thermal coefficients of expansion. Woo does not specifically disclose that the second layer is isolated from the first layer when a temperature of 700°C or greater is applied. However, because the first layer, barrier layer, and second layer are made of the same materials as those of Applicant's invention, it appears that the layered structure of Woo would inherently possess the function of the second layer is isolated from the first layer when a temperature of 700°C or greater is applied. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on"); and *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) (a

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case indicating that the burden of proof can be shifted to the applicant to show that the subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103). Additionally, it is noted that claims 19-38 are product claims. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claim 20, Woo discloses that the barrier film can include silicon dioxide, silicon nitride or TEOS (col. 3, ln. 59 – col. 4, ln. 3).

Regarding claim 21, Woo discloses that the first planarization layer can include tungsten, titanium and polycrystalline silicon (col. 3, ln. 48-58).

Regarding claim 22, Woo discloses that the second planarization layer can include tungsten, titanium, polycrystalline silicon and TEOS (col. 4, ln. 4-11).

Regarding claims 23 and 24, Woo discloses that the second planarization layer can include a refractive metal (tungsten or titanium) (col. 4, ln. 4-11).

Regarding claim 25, Woo discloses that the second planarization layer can include TEOS (col. 4, ln. 11-15).

Regarding claims 26, 28 and 37, Woo discloses a first single layer (14 and/or 15), inherently having a thermal coefficient of expansion, a nitride film (16) superjacent the first layer, and a second single layer (17 and/or 18 and/or 20), inherently having another thermal

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coefficient of expansion, superjacent the nitride film (col. 3, ln. 22 – col. 4, ln. 15). Woo does not specifically disclose that the first and second layers are flowable at temperatures of at least 700°C. However, because the first and second layers are made of the same materials as those of Applicant's invention, it appears that these layers of Woo would inherently possess the function of being flowable. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on");

Regarding claim 29, Woo discloses that the nitride film can include silicon nitride (col. 3, ln. 59 – col. 4, ln. 3).

Regarding claims 30-32, Woo discloses that the first layer can include tungsten, titanium and polycrystalline silicon (col. 3, ln. 48-58).

Regarding claim 33, Woo discloses a semiconductor substrate (10), a first single planarization layer (14 and/or 15), inherently having a thermal coefficient of expansion and a first reflow temperature, on the substrate, a barrier film (16) having structural integrity on the planarization layer, and a second single layer (17 and/or 18 and/or 20), inherently having a thermal coefficient of expansion, superjacent the barrier film (col. 3, ln. 22 – col. 4, ln. 15). Woo does not specifically disclose that the barrier film prevents the planarization layer and the second layer from interacting when heated. However, because the first layer, barrier layer, and second layer are made of the same materials as those of Applicant's invention, it appears that the layered structure of Woo would inherently possess the function of preventing the planarization layer and

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the “another layer” from interacting when heated. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) “where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on”).

Regarding claim 34, Woo discloses that the barrier film can include silicon nitride, silicon dioxide and TEOS (col. 3, ln. 59 – col. 4, ln. 3).

Regarding claim 35, Woo discloses that the planarization layer can include tungsten, titanium and polycrystalline silicon (col. 3, ln. 48-58).

Regarding claim 36, Woo discloses that the second layer can include tungsten, titanium, polycrystalline silicon and TEOS (col. 4, ln. 4-11).

Regarding claim 38, Woo does not specifically disclose that the barrier film possesses the property of maintaining its structural integrity when heated to a temperature of at least 700°C. However, because the barrier layer is made of the same materials as that of Applicant’s invention, it appears that the barrier film of Woo would inherently possess the function of maintaining its structural integrity when heated to a temperature of at least 700°C. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) “where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on”).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woo et al. (US 5,262,352) in view of Cheung et al. (US 4,693,925).

Regarding claim 39, Woo discloses a first layer (14 and/or 15), a second layer (17 and/or 18 and/or 20), and a barrier layer (16) in between the first and second layers (col. 3, ln. 22 – col. 4, ln. 15). Woo does not specifically disclose subjecting the first, second and barrier layers to a temperature of 700°C or greater. However, Woo does disclose depositing a polysilicon interconnection layer (24) and siliciding the polysilicon interconnection layer after the first, second and barrier layers have been formed (col. 5, ln. 26-27). Like Woo, Cheung discloses depositing a polysilicon interconnection layer and siliciding the polysilicon layer. Cheung teaches that the polysilicon can be successfully silicided by depositing a layer of refractory metal on the polysilicon layer and annealing the substrate at a temperature of 600-800°C (col. 5, ln. 44-50; col. 3, ln. 39-45). At the time of the invention, it would have been obvious to one of ordinary skill in the art to subject the first, second and barrier layers of Woo to an anneal of 700°C or greater because Woo discloses siliciding the polysilicon interconnection layer after the first, second and barrier layers have been formed and Cheung teaches that a polysilicon

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interconnection layer can be successfully silicided by subjecting the polysilicon and metal layer to an anneal of 600-800°C.

Woo does not specifically disclose that the barrier film prevents the planarization layer and the second layer from interacting when heated. However, because the first layer, barrier layer, and second layer are made of the same materials as those of Applicant's invention, it appears that the layered structure of Woo would inherently possess the function of preventing the planarization layer and the "another layer" from interacting when heated. See *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971) "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on").

Regarding claim 40, Woo discloses that the first layer can include tungsten and/or titanium (col. 3, ln. 48-58).

Regarding claim 41, Woo discloses that the second layer can include tungsten and/or titanium and/or TEOS (col. 4, ln. 4-11).

Regarding claim 42, Woo discloses that the barrier film can include silicon nitride, silicon dioxide and TEOS (col. 3, ln. 59 – col. 4, ln. 3).

### ***Response to Arguments***

Applicant's arguments filed December 28, 2005 have been fully considered but they are not persuasive.



Regarding the rejections of claims 19 and 33 as being anticipated by Woo, Applicant argues, “There is no evidence that any of these layers taught by the Woo reference serve to planarize the film stack.” Claims 19 and 33 do not recite that the first and second layers planarize the film stack. Additionally, Woo shows that the first and second layers are planar (see Figures 1-4). Therefore, these rejections are maintained.

Regarding the rejections of claims 19, 26 and 33, Applicant argues “a layer is not flowable merely because it contains certain materials.” However, Applicant has provided no evidence that the first and second layers taught by Woo are not inherently flowable. Furthermore, Applicant’s specification does not state that the first and second layers have to be formed in any particular way in order to be flowable. Also, Applicant argues “Silicon Processing for the VLSI Era Volume 1” allegedly explains that the capacity of BPSG to flow at a given temperature is a function of the concentration of dopants therein. However, Applicant has not provided this reference and none of the rejections of claims 19-42 state that layers of BPSG inherently flow at a given temperature. Therefore, these rejections are maintained.

Regarding the rejections of claims 19, 26 and 33, Applicant argues that Woo does not teach “single” first and second layers. Any of the first and second layers cited above can individually meet the claim limitations of a “single layer”. Therefore, these rejections are maintained.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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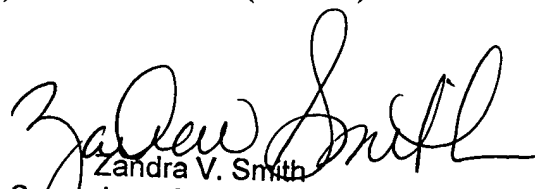
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN  
March 14, 2006

  
Zandra V. Smith  
Supervisory Patent Examiner  
15 March 2006